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Brouard et al.

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(54) **DEVICE FOR COUNTING AND DISPENSING OBJECTS**

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(73) Assignee: **STIPLASTICS**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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PCT Pub. Date: **Aug. 20, 2015**

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(30) **Foreign Application Priority Data**

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A61J 7/00 (2006.01)
B65D 83/04 (2006.01)
A61J 7/02 (2006.01)

(52) **U.S. Cl.**
CPC ***A61J 7/0076*** (2013.01); ***A61J 7/02*** (2013.01); ***B65D 83/0409*** (2013.01)

(58) **Field of Classification Search**
CPC A61J 7/02; A61J 7/0481; A61J 7/0076; B65D 83/0409; B65D 83/04
(Continued)

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(57) **ABSTRACT**

The invention relates to a device (**1**) for counting and dispensing objects (**2**), comprising two slidably movable elements (**10**, **11**) relatively to each other,

a first element (**10**) comprising a conduit (**100**) for dispensing objects to be counted and dispensed,

the second element (**11**) cooperating with the first element for forming two obturators (**1**A, **1**B) delimiting in the dispensing conduit (**100**) a chamber (**101**) adapted for containing a determined number of said objects,

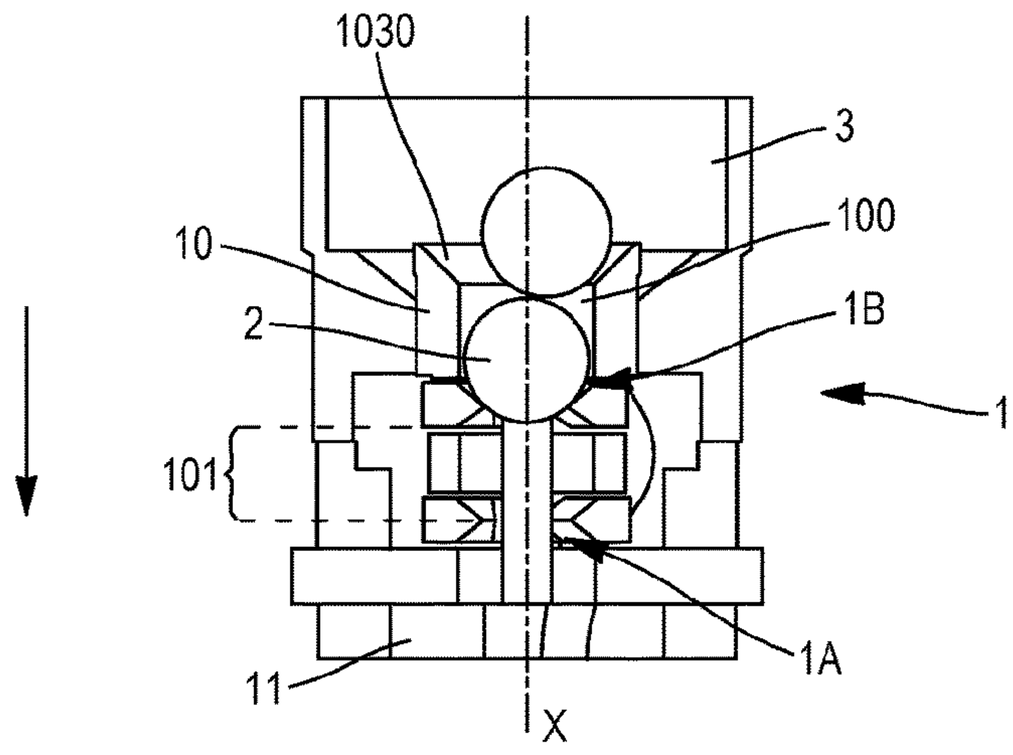
said obturators (**1**A, **1**B) being able to adopt, depending on the relative position of said first and second elements:

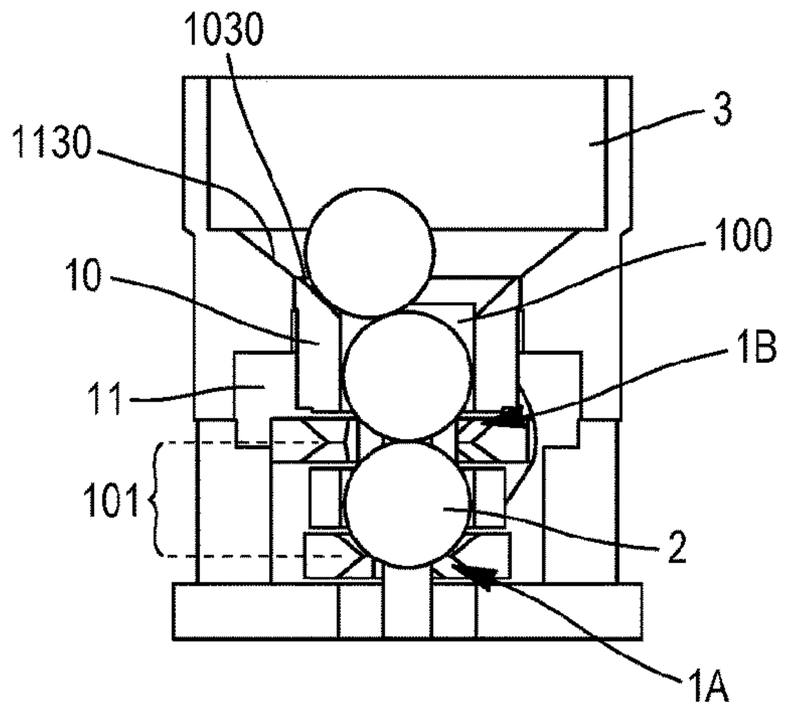
an open configuration, in which the obturator defines an orifice with a dimension adapted for letting through an object to be counted and dispensed, and

an obturation configuration, wherein said orifice has an insufficient dimension for letting through an object,

the first and second elements being laid out for providing, by relative sliding, an operating sequence of the obturators wherein:

(Continued)





(i) a first obturator is in an open configuration while the second obturator is in an obturation configuration,
(ii) the obturators are both in an obturation configuration,
(iii) the first obturator is in an obturation configuration while the second obturator is in an open configuration,
(iv) the obturators are both in an obturation configuration.

13 Claims, 10 Drawing Sheets

(58) **Field of Classification Search**
USPC 221/7, 276
See application file for complete search history.

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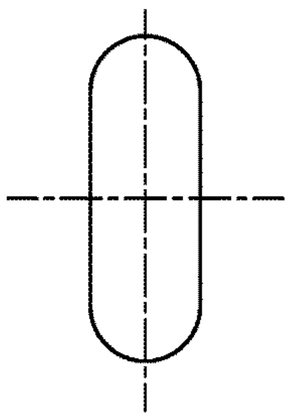


FIG. 1A

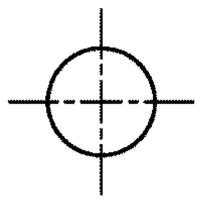


FIG. 1B

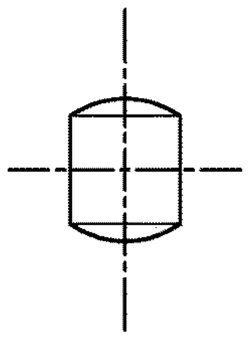


FIG. 1C

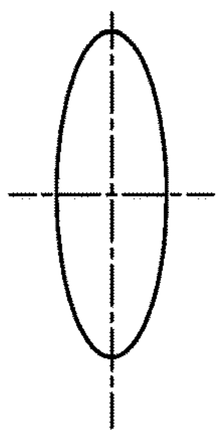


FIG. 1D

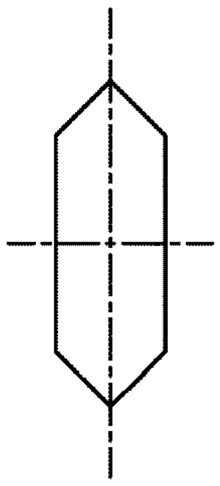


FIG. 1E

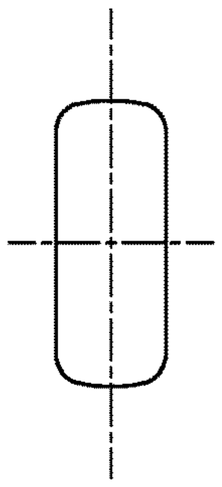
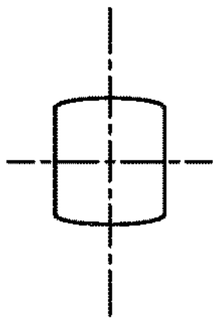


FIG. 1F



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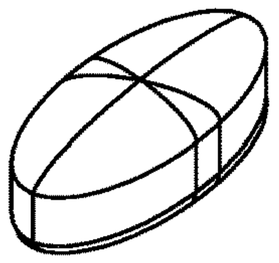


FIG. 1H

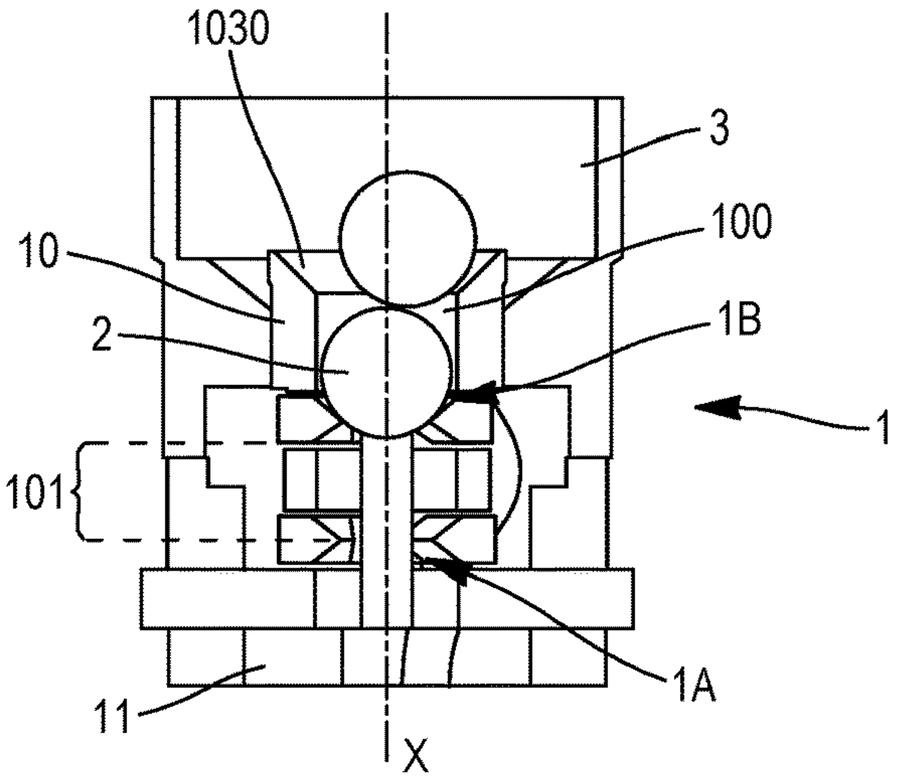
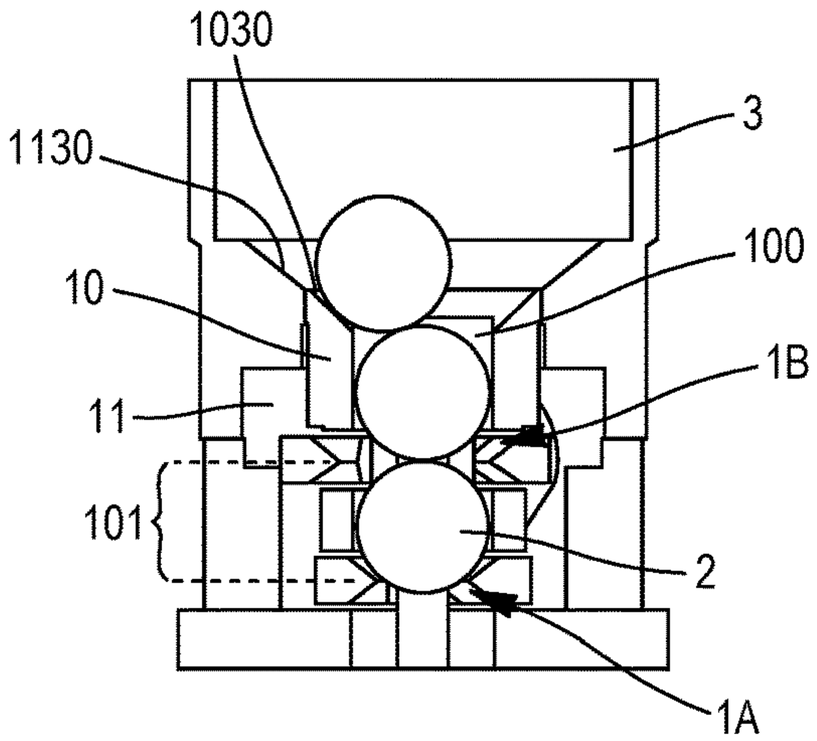


FIG. 2A



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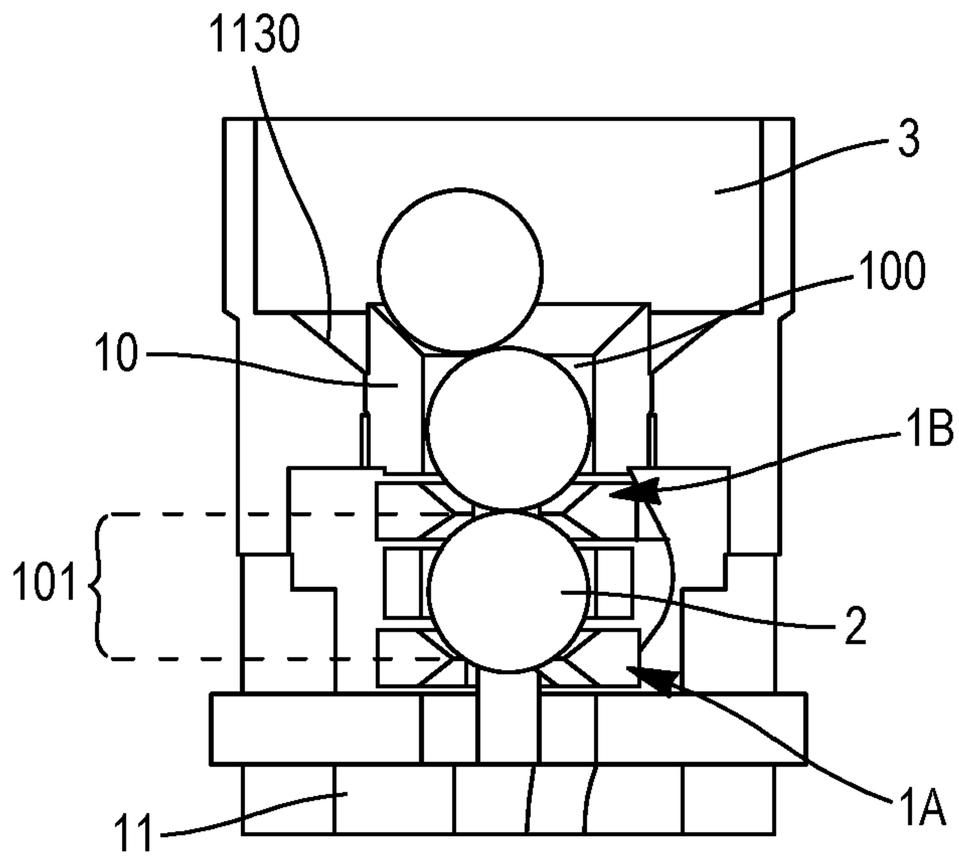
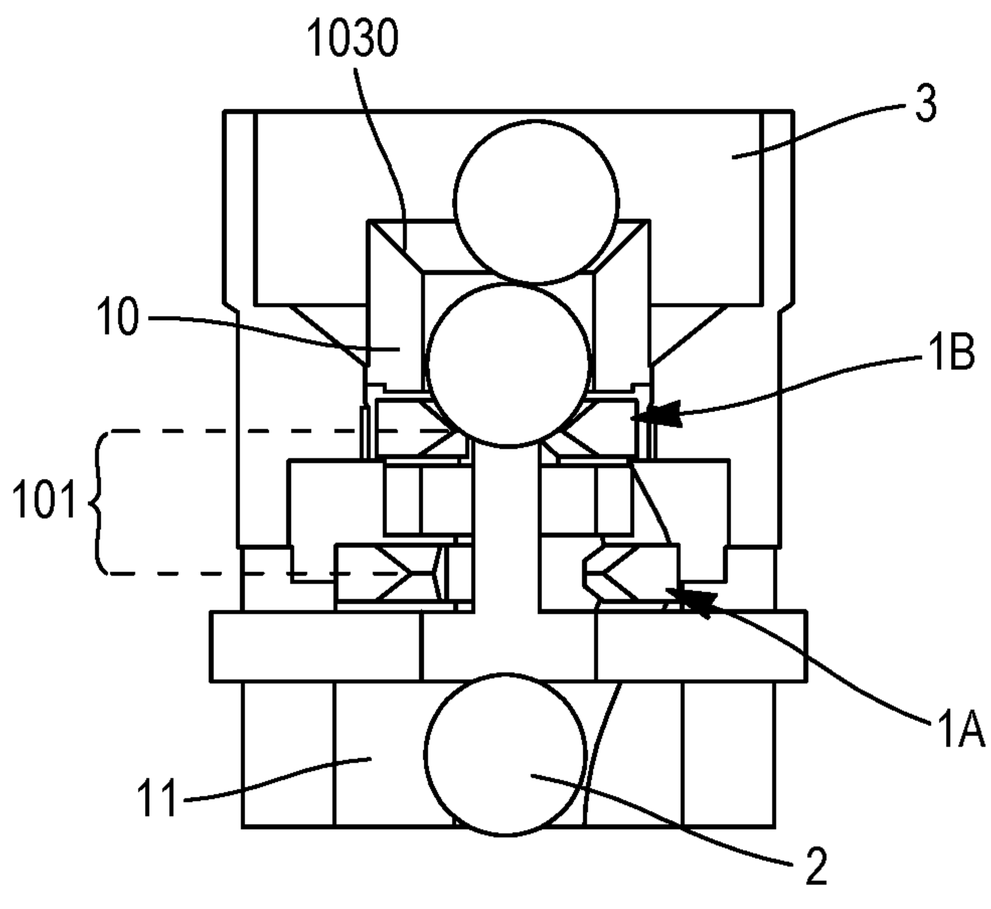


FIG. 2C



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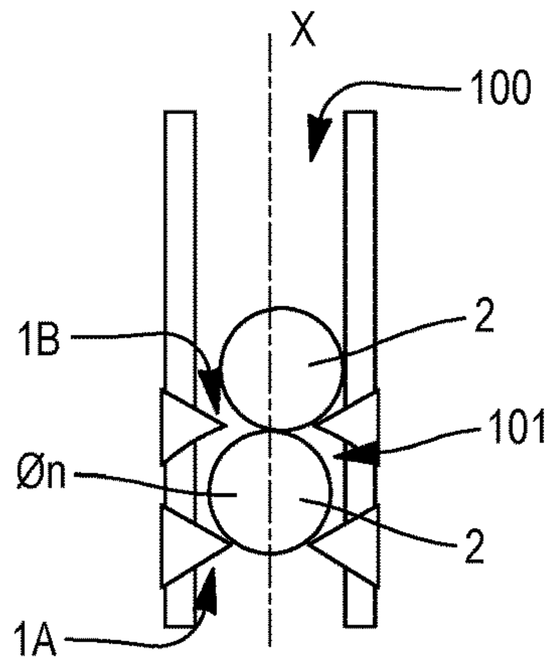


FIG. 3A

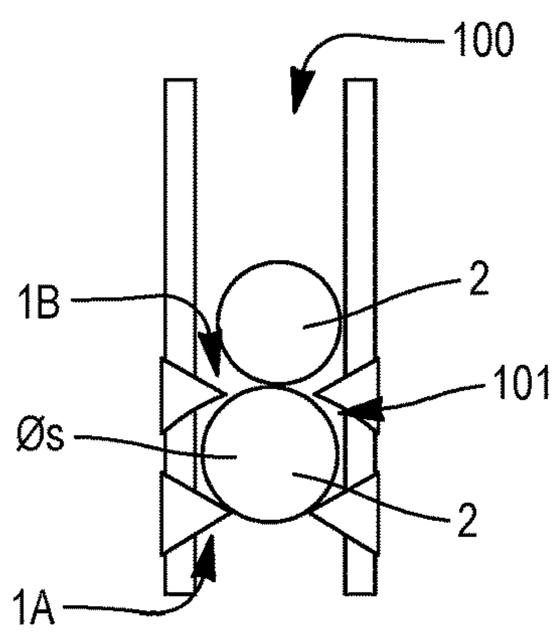
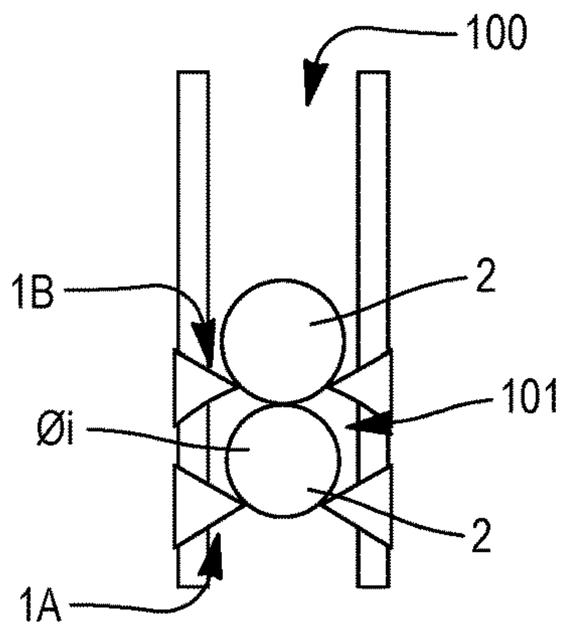


FIG. 3B



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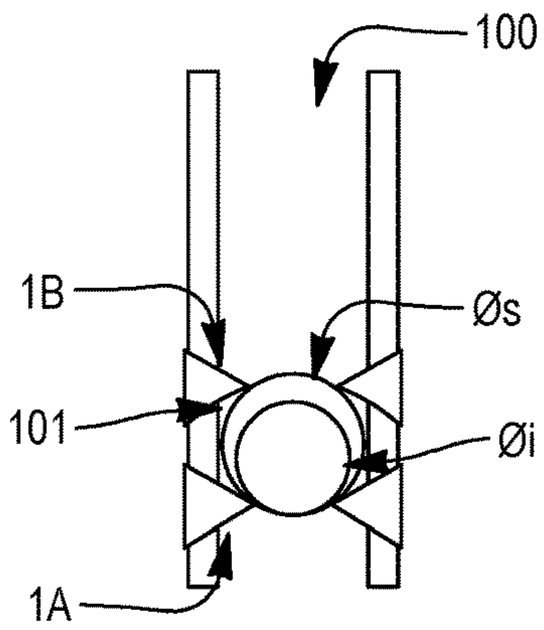

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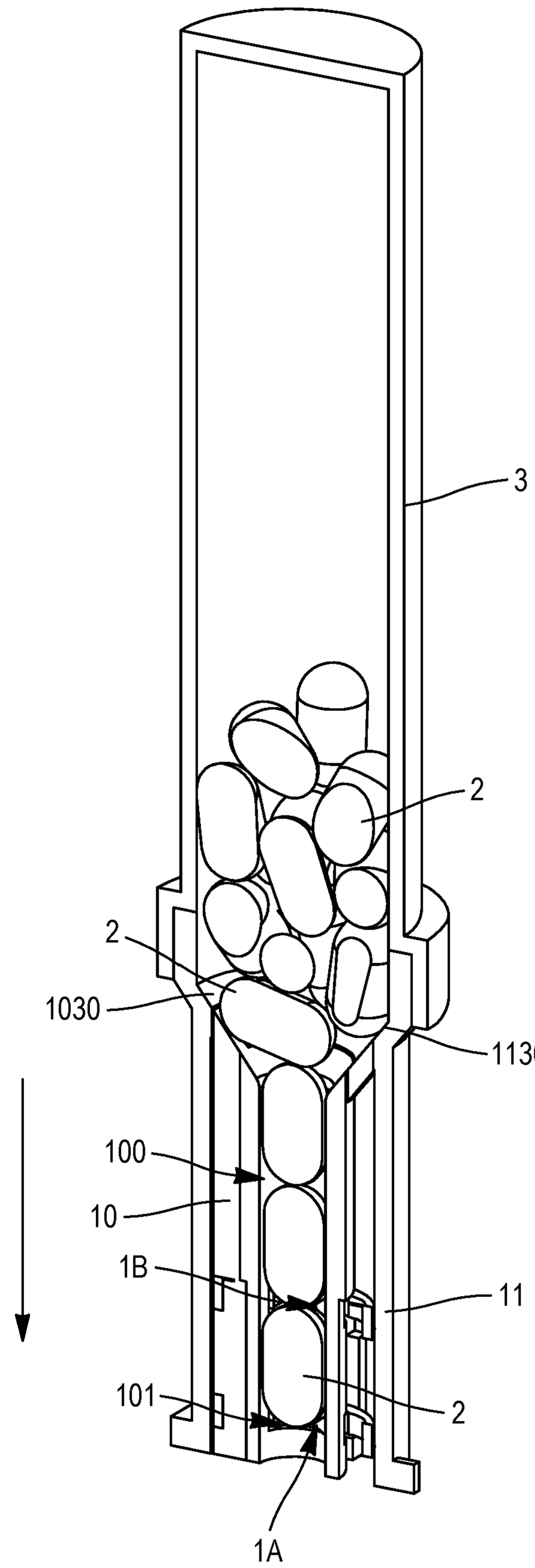


FIG. 4

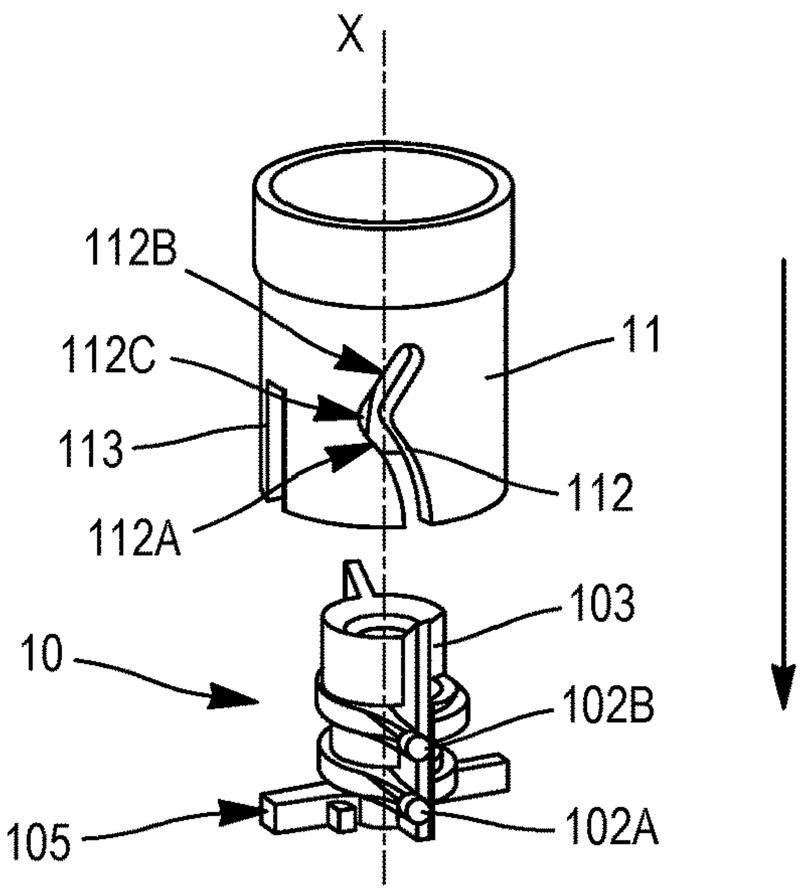


FIG. 5A

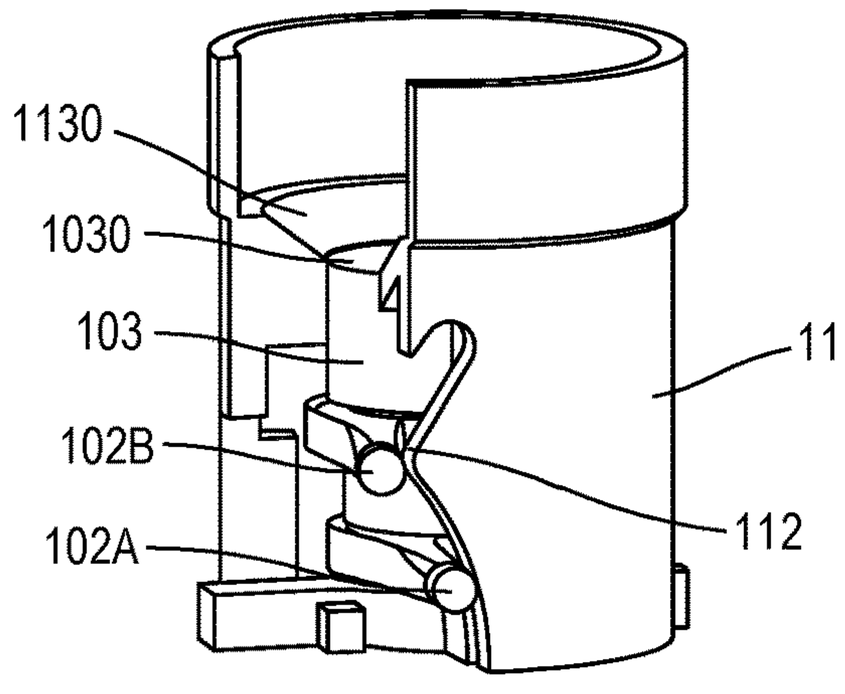
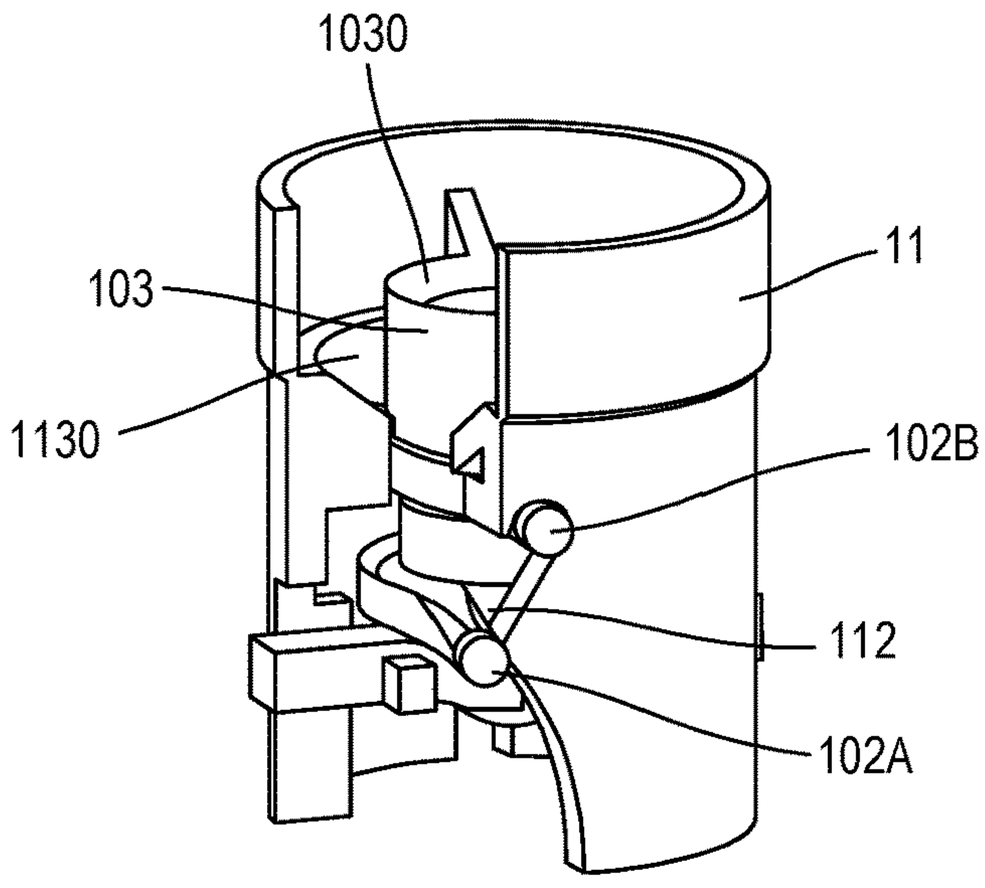


FIG. 5B



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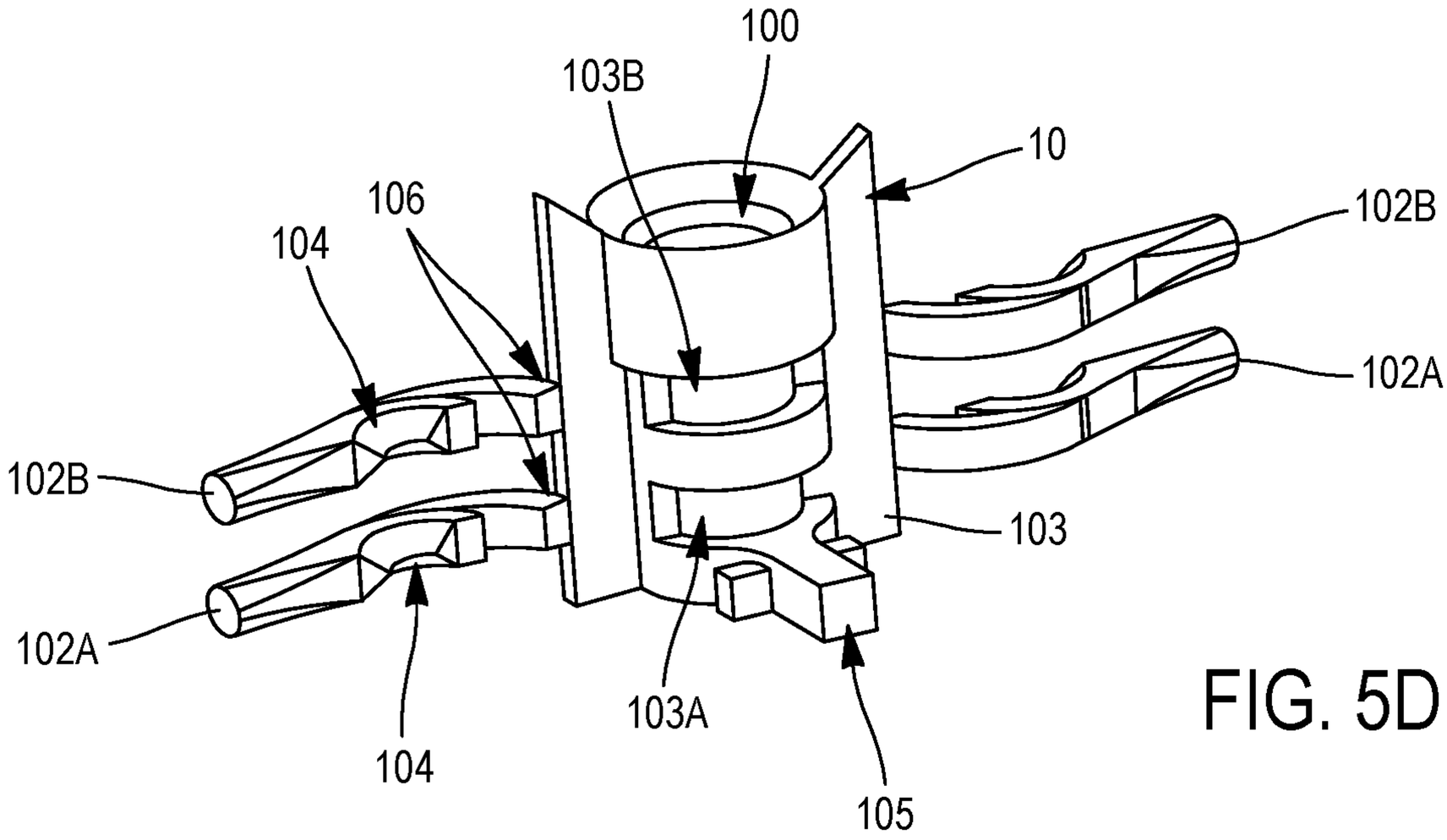
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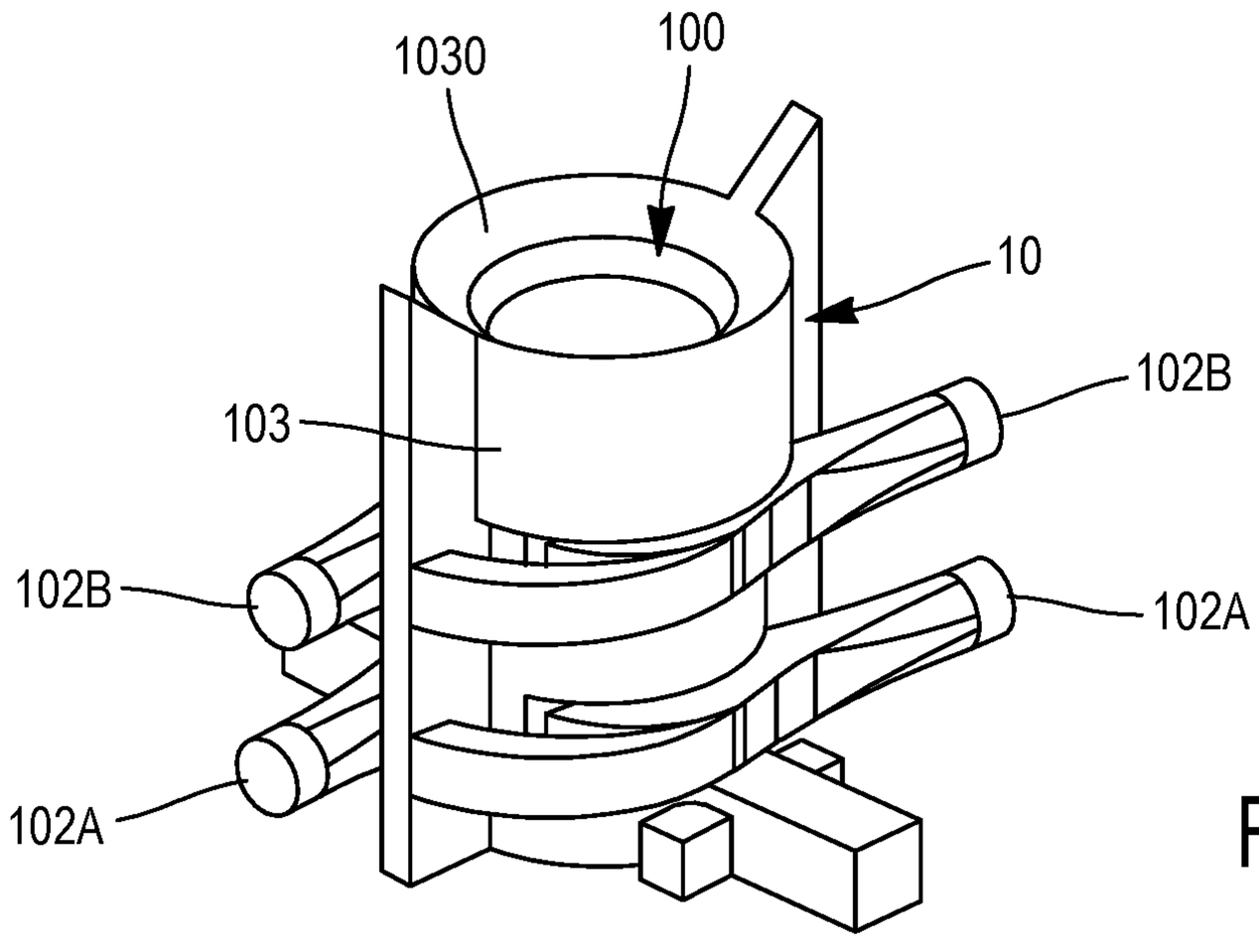
102B
102A
102B
103
102A
103A
104
105

FIG. 5D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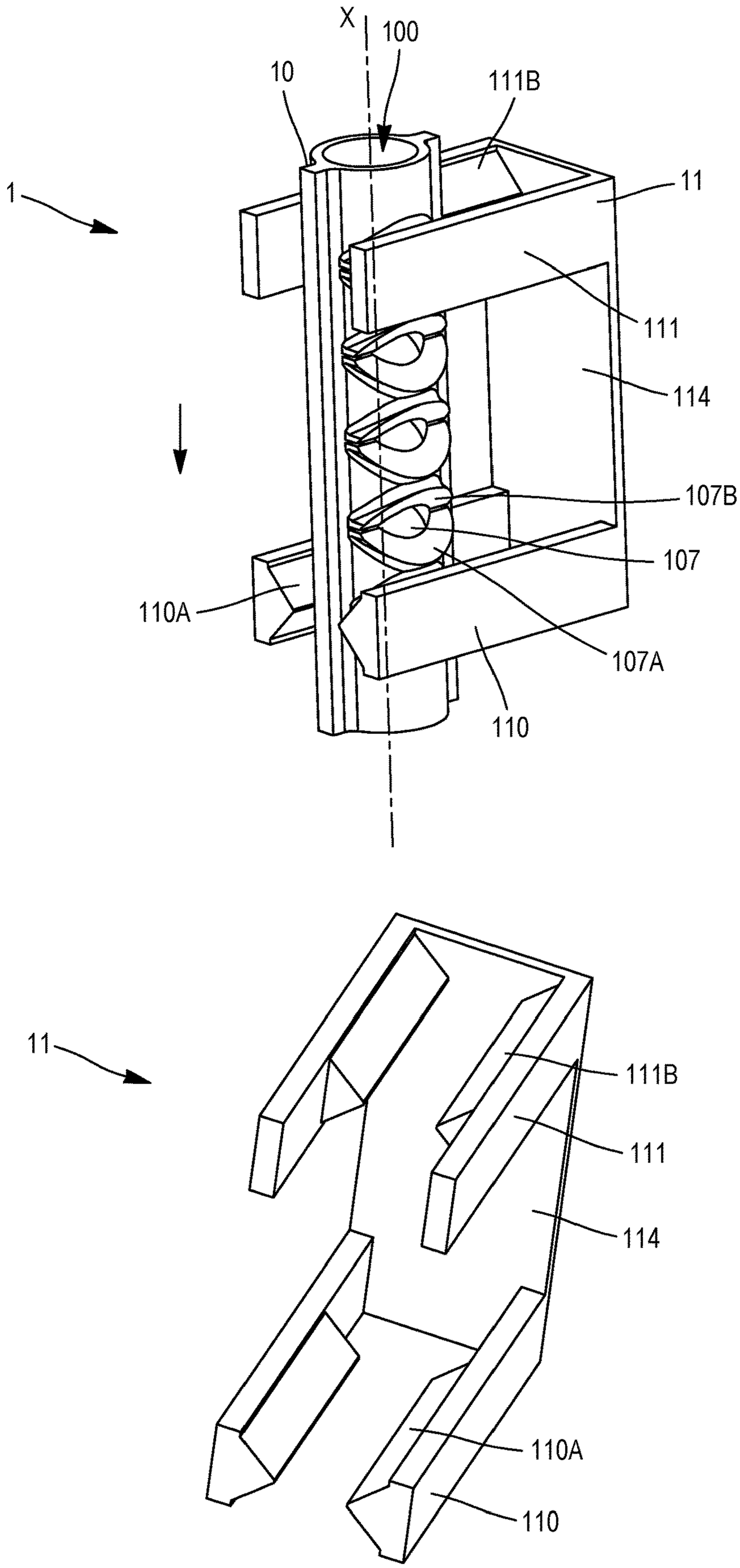
102A
102A

FIG. 5E


X
100
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111B
1
11
111
114
107B
107
110A
107A
110

FIG. 6A

11
111B
111
114
110A
110

FIG. 6B

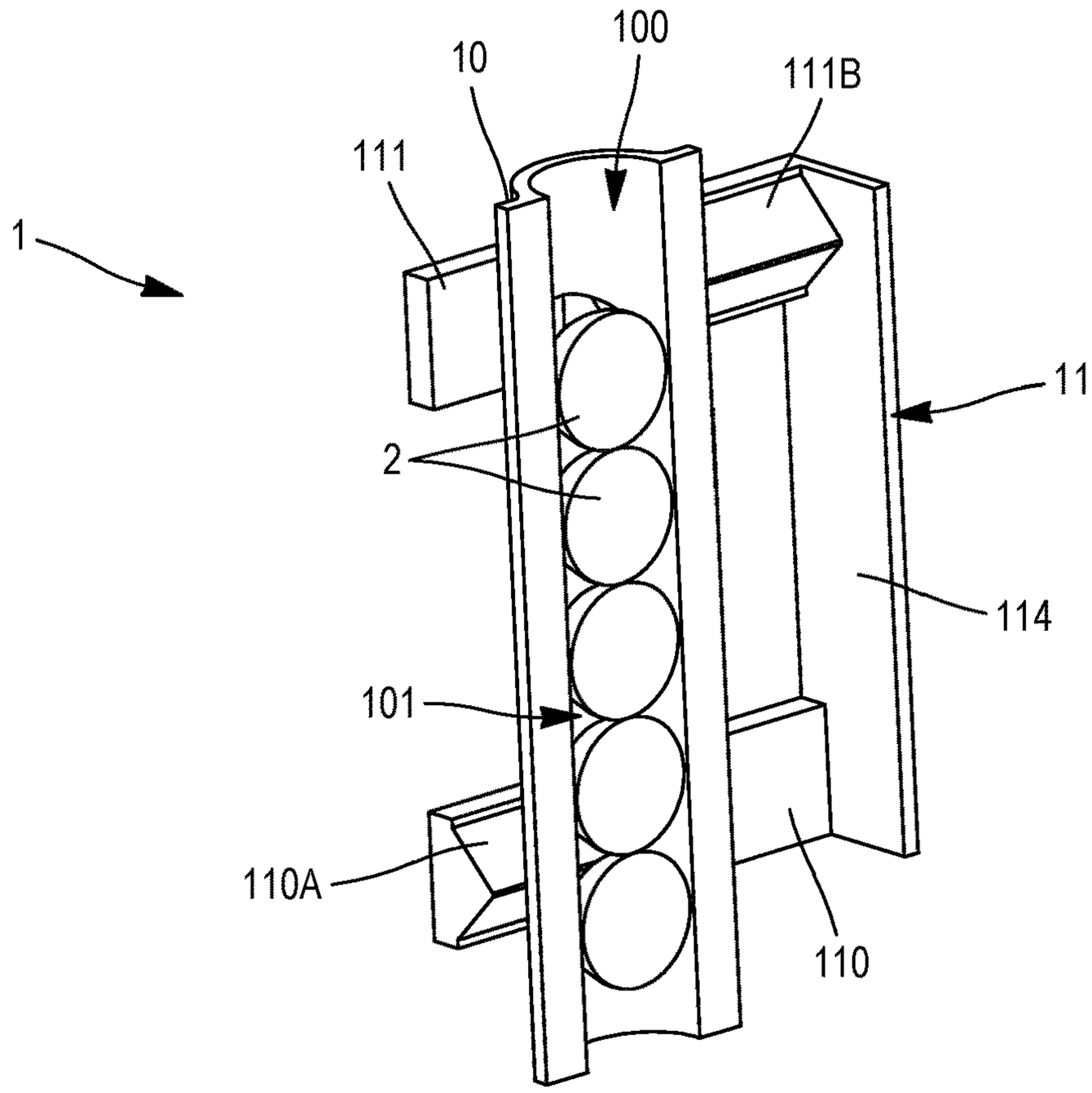
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FIG. 6C

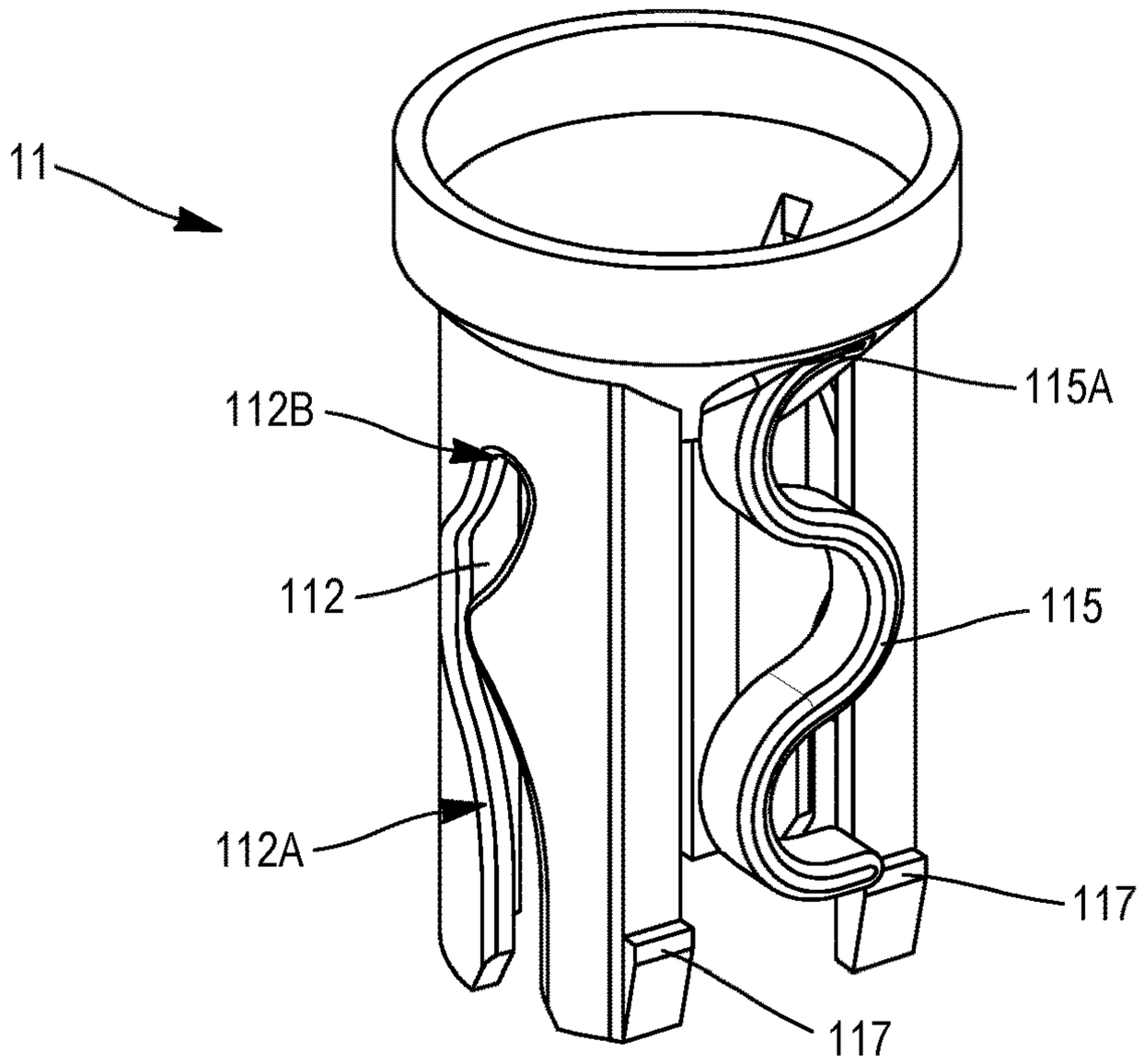
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FIG. 7A

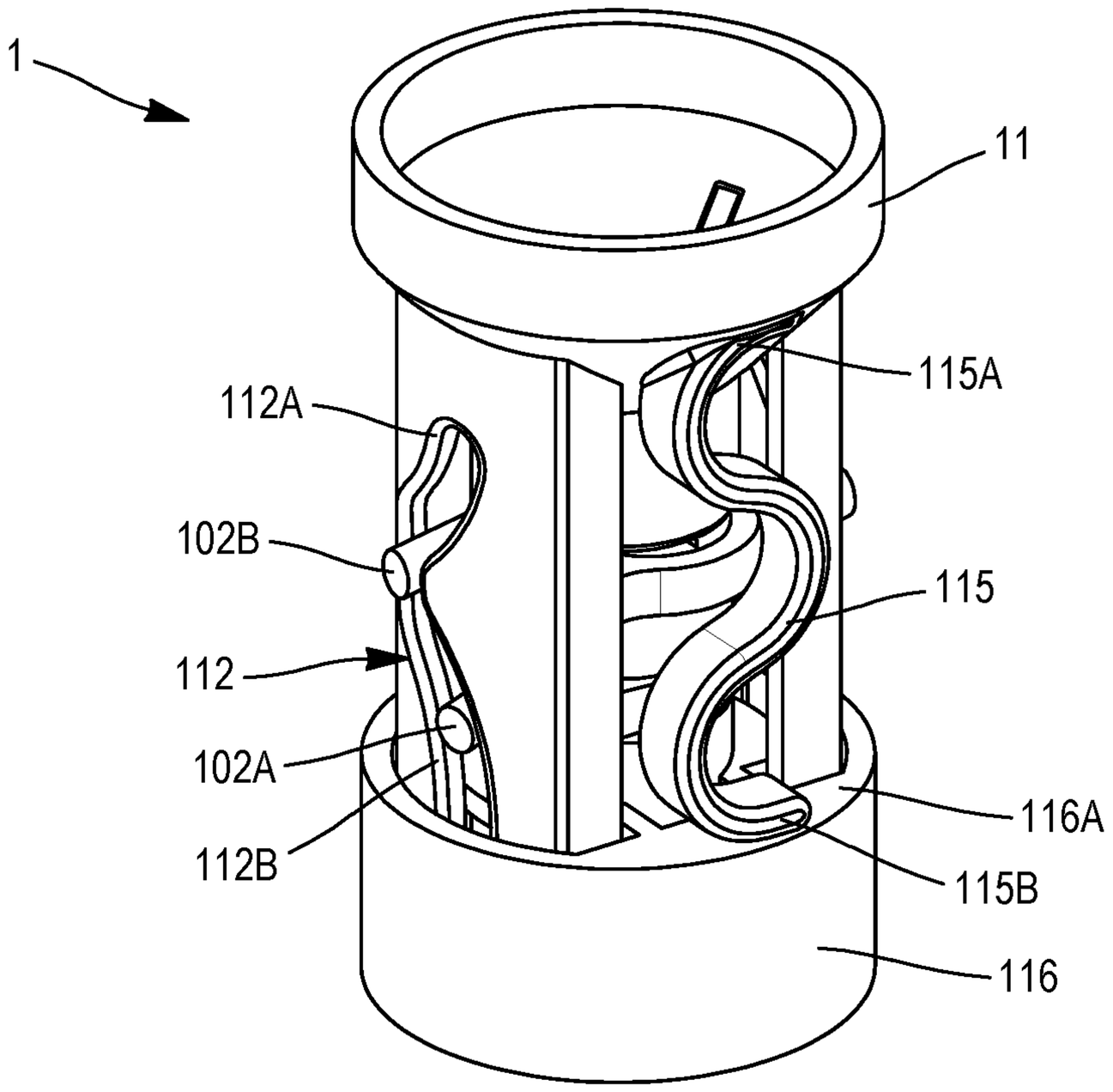
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FIG. 7B

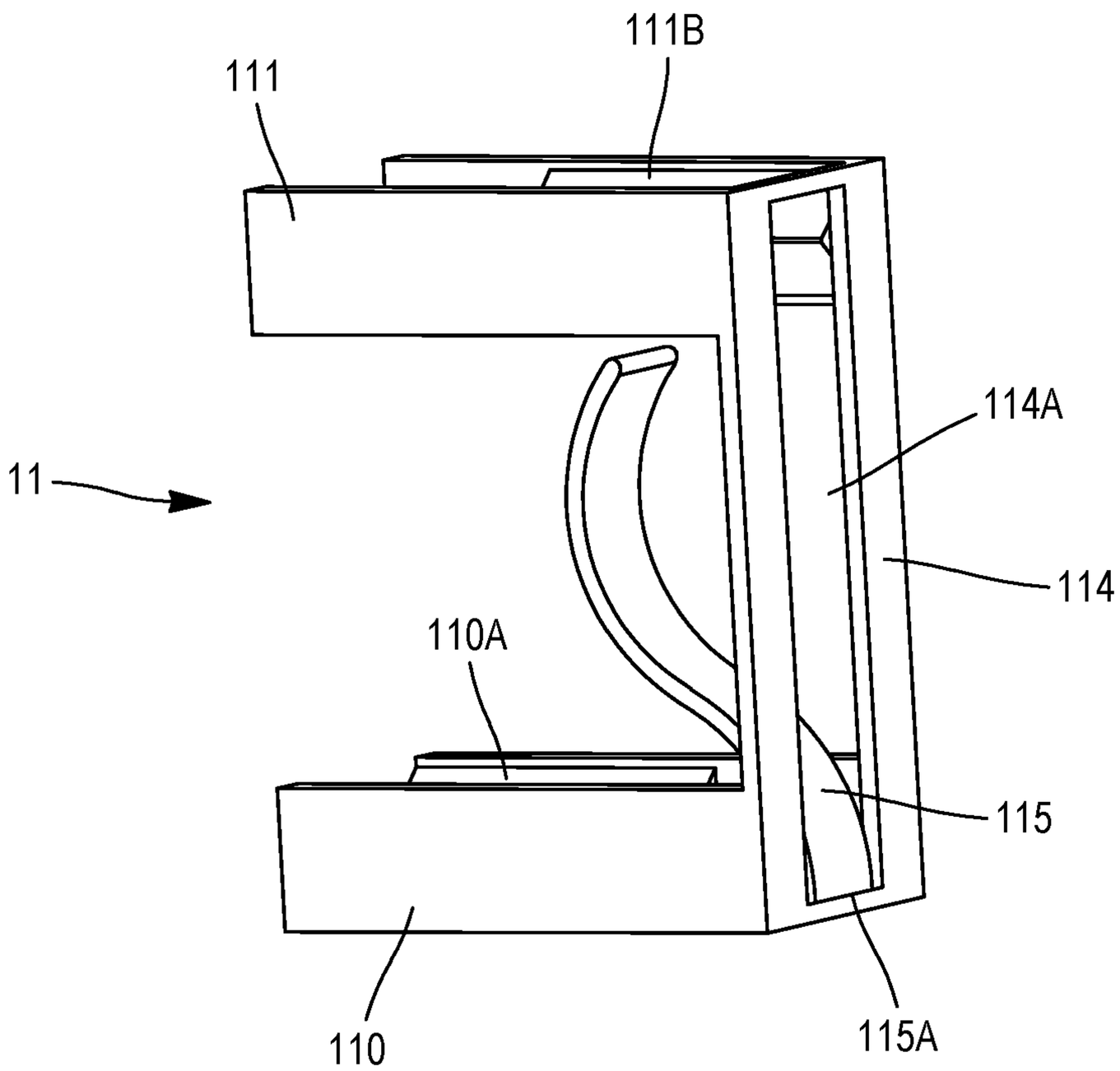
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FIG. 8A

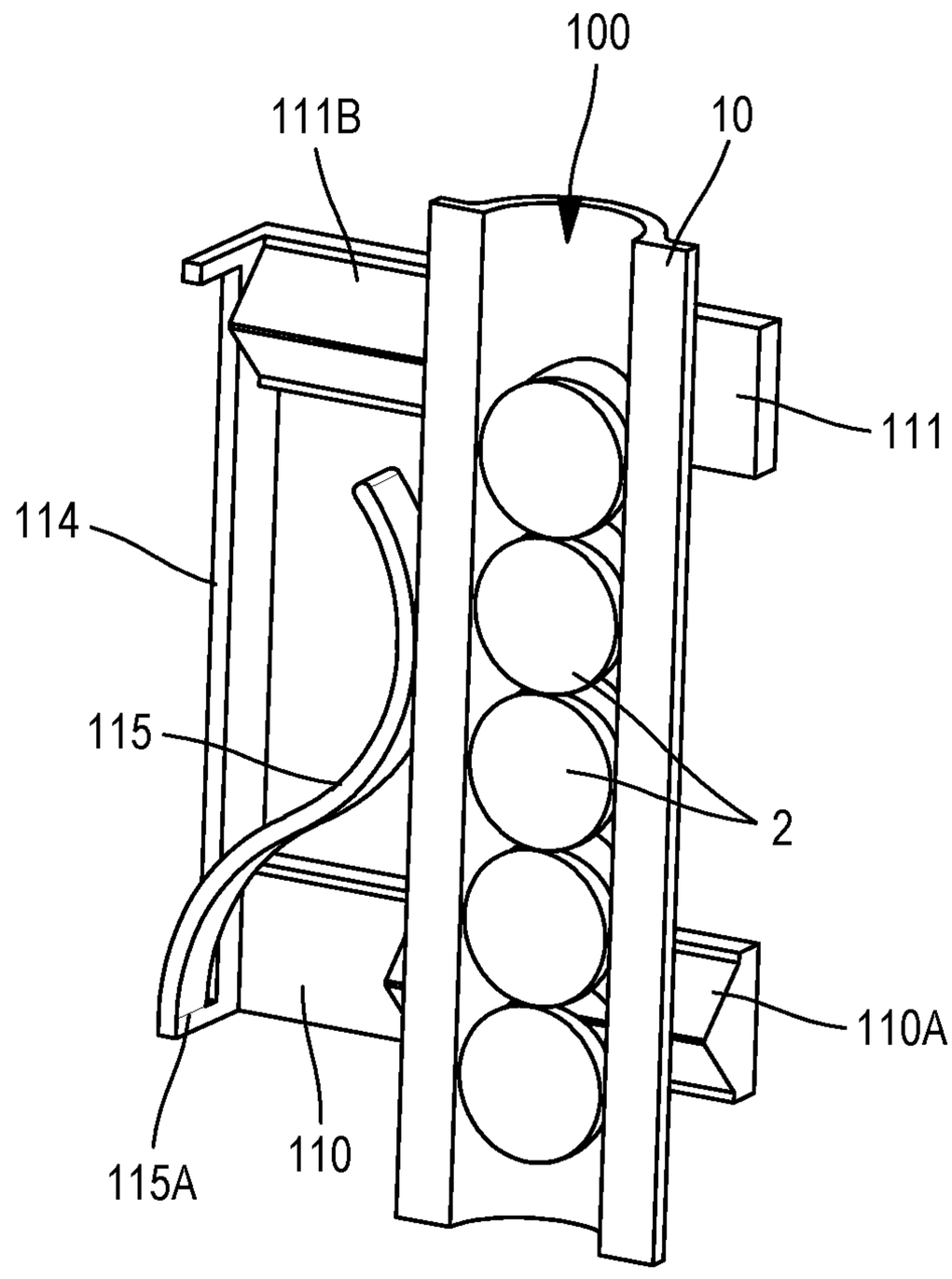

FIG. 8B

DEVICE FOR COUNTING AND DISPENSING OBJECTS

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a national phase entry under 35 U.S.C. § 371 of International Application No. PCT/EP2015/052972, filed Feb. 12, 2015, which claims priority from French Patent Application No. 1451065, filed Feb. 12, 2014, the disclosures of which are incorporated by reference herein.

FIELD OF THE INVENTION

The invention relates to a device for counting and dispensing objects such as beads, granules, micro-granules, tablets or capsules, and to a container containing such objects and comprising such a device, notably a tube of homeopathic granules.

BACKGROUND OF THE INVENTION

Within the scope of homeopathic treatment for example, a determined number of granules have to be administered to a patient, without said granules being directly handled by the patient.

A certain number of dispensers have thus been developed with view to issuing a determined number of granules.

Document EP 0 002 403 describes a dispenser of granules laid out at the end of a container containing granules and comprising a rotary disc including an orifice for letting though a granule and a lug for retaining the remaining granules in the container. In order to release a granule, the rotary disc has to be brought into a first position in which it allows admission of a granule into a cell laid out in a stopper fixed on the container and then the rotary disc has to be turned so as to bring the passage orifice in front of the cell in order to allow the passing of the granule into the stopper.

Document FR 2 759 677 describes as for it, a dispenser of granules comprising a neck having a helical ramp for flow of the granules and an element comprising a housing for a granule and movable in sliding between an admission position of a granule from the ramp and a position for releasing the granule.

Document FR 2 867 459 describes a dispenser of granules, the operation of which is based on elastic deformation of said dispenser by applying a pressure in a direction transverse to the direction of flow of the granules.

Document CA 1,297,844 describes a dispenser of granules laid out at the end of a tube and comprising a chimney capable of pivoting between a centered position with respect to the tube allowing admission of a determined number of granules and an off-center position with respect to the tube in which it blocks the passage of the granules and allows release of the granules out of the container.

Finally, document FR 2 928 356 describes a dispenser of tablets comprising a tank of tablets and a sliding drawer including a housing for a tablet. Said drawer is designed so as to adopt different successive positions in which it either communicates with the tank on the one hand and with an outlet orifice on the other hand for allowing release of a single tablet at a time.

Now, the homeopathic granules are objects with a substantially spherical shape but for which the dimensions may vary in a relatively wide range around a rated diameter.

Therefore, in the presence of granules with a diameter larger than the rated diameter, there exists a risk that the granule be greater than the housing provided for receiving it, so that the setting into motion (rotation or translation) of the housing intended to transfer the granule from the tank to an outlet orifice exerts a shearing force on the granule, possibly inducing breakage of the granule and/or jamming of the dispenser.

Conversely, in the presence of granules of a diameter less than the rated diameter, the risk is that two granules simultaneously engage into the housing. The setting into motion of the housing then exerts a great shearing force on the granule which is only partly engaged into the cell, which may then cause breakage of said granule and/or jamming of the dispenser. In the particular case of tablets with a film, this breakage may be detrimental to the actual efficiency of the drug treatment, the active ingredients not having time for attaining their target.

In homeopathic applications, for which the grain size is generally not very controlled, a problem often encountered with existing dispensers is the absence of release of the expected granule at the end of the actuation sequence of the dispenser.

Other applications, notably in the pharmaceutical field, assume that a determined number of objects are dispensed. For example such is the case of gel capsules, micro-granules, capsules and tablets.

SHORT DESCRIPTION OF THE INVENTION

A goal of the invention is therefore to design a device for counting and dispensing objects which avoids the problems encountered with existing dispensers and notably which limits or even suppresses the risks of jamming and of malfunction of the dispenser and which minimizes the forces exerted on the objects in order to preserve their integrity. A goal of the invention is also to design a device which allows reliable counting of the issued objects. Another goal of the invention is to design a device for counting and dispensing which may be manufactured with a reduced number of elements and with methods compatible with manufacturing in large series, in order to ensure the economic competitiveness of the dispenser as compared with existing devices.

According to the invention, a device for counting and dispensing objects is proposed, comprising two slidably movable elements relatively to each other,

- a first element comprising a conduit for dispensing objects to be counted and dispensed,
- the second element cooperating with the first one for forming two obturators delimiting in the dispensing conduit a chamber adapted for containing a determined number of said objects,
- said obturators being able to adopt, depending on the relative position of said first and second elements:
  - a so-called open configuration of the chamber, in which the obturator defines an orifice with a dimension adapted for letting through an object to be counted and dispensed, and
  - a so-called obturation configuration of the chamber, in which said orifice has a dimension insufficient for letting through an object, the obturator having two bevelled portions facing each other and not contiguously joined in said obturation configuration,
- the first and second elements being arranged so as to provide, by relative sliding, a sequence for operating the obturators wherein:

(i) a first obturator is in an open configuration while the second obturator is in an obturation configuration of the chamber,

(ii) the first and the second obturators are both in an obturation configuration of the chamber,

(iii) the first obturator is in an obturation configuration while the second obturator is in an open configuration of the chamber,

(iv) the first and the second obturators are both in an obturation configuration of the chamber.

According to an embodiment, the first element is slidably laid out with respect to the second element along an axial direction of the conduit so that, during a portion of the operating sequence, the first element extends beyond the second element towards the upstream side relatively to the direction of flow of the objects, so as to provide mixing of the objects to be counted and dispensed located upstream from the conduit.

In a particularly advantageous way, the conduit has, at its upstream end, a tilted wall so as to orient and/or guide in the conduit the objects to be counted and dispensed.

According to a particular embodiment of the device, the first element comprises a generally tubular body having two pairs of opposite radial apertures and two pairs of flexible arms having a protrusion engaged into a respective radial aperture of the body, and the second element having a generally tubular shape, the wall of which is pierced with a pair of non-rectilinear grooves in which move two respective flexible arms during the sliding of the first element in the second element, the profile of said grooves being designed so as to vary the engagement of the protrusion of the flexible arms in the conduit. Each pair of protrusions defines together an obturator, the open or obturation configuration of which depends on the distance between two opposite protrusions.

According to another embodiment, the second element is slidably laid out with respect to the first element in a plane perpendicular to an axial direction of the conduit.

According to a particular embodiment of the device, the first element has a generally tubular shape, the wall of which is pierced with two pairs of apertures and the second element has two pairs of parallel arms extending perpendicularly to an axial direction of the conduit, each arm having a protrusion selectively engaged into the conduit through a respective aperture. The distance between two protrusions facing each other is sufficiently small for preventing the passage of an object; moreover, each arm has a portion without such a protrusion. Depending on the position of the first element with respect to the second element, the conduit is at least partly obturated by two protrusions facing each other, thereby defining an obturator in an obturation configuration, or the conduit is not obturated by said protrusions, thereby defining the open configuration of said obturator.

Advantageously, each protrusion has a bevelled shape. This bevelled shape cooperates with the convex end of each object in order to avoid shearing of said object when the obturator operates.

Preferably, in an obturation configuration of an obturator, said bevelled protrusions facing each other are not contiguously joined up.

According to an advantageous embodiment, the device further comprises a device for relatively returning the first and second elements.

Preferably, said return device comprises an elastic return member secured to the first or to the second element.

According to a preferred embodiment of the device, the first and the second element are each made in one piece and the device is exclusively consisting of said first and second elements.

Another object of the invention relates to a container containing objects and comprising a device for counting and dispensing said objects as defined above.

According to an advantageous application of the invention, the objects are homeopathic granules, gel capsules, tablets, capsules or micro-granules.

SHORT DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will become apparent from the detailed description which follows, with reference to the appended drawings wherein:

FIGS. **1**A to **1**H illustrate various examples of objects which may be dispensed by the device according to the invention,

FIGS. **2**A to **2**D schematically illustrate the different configurations of the obturators of a device according to the invention,

FIGS. **3**A to **3**D schematically illustrate the relative position of a bead contained in the chamber and of the obturators depending on the size of the rounded object,

FIG. **4** schematically illustrates a device according to the invention in which the objects to be dispensed are gel capsules,

FIGS. **5**A to **5**E illustrate the elements of a device according to a first embodiment of the invention,

FIGS. **6**A to **6**C illustrate the elements of a device according to a second embodiment of the invention,

FIGS. **7**A and **7**B illustrate an alternative of the device of FIGS. **5**A to **5**E comprising a return device of an element with respect to the other,

FIGS. **8**A and **8**B illustrate an alternative of the device of FIGS. **6**A to **6**C comprising a return device of one element relatively to the other.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The invention generally applies to the dispensing of any object having a spherical or spheroidal shape or further an elongated shape with convex ends. According to a non-limiting embodiment, the objects may have rotational symmetry with respect to an axis which extends between both convex ends.

In the present text, by "elongated" is designated an object for which the largest dimension (or length) extends between both convex ends.

The elongated objects are intended to be oriented in a conduit of the counting and dispensing device one following the others in the direction of their largest dimension.

FIGS. **1**A to **1**G illustrate a few examples of such objects.

A gel capsule is illustrated in FIG. **1**A. Said gel capsule may be defined as having a cylindrical portion of circular section and two symmetrical hemispherical ends, for which the radius of curvature is equal to the radius of the cylindrical portion. The distance between both hemispherical ends is greater than the diameter of the circular portion.

FIG. **1**B illustrates a spherical object, such as a granule.

FIG. **1**C illustrates a micro-granule, which is a micro-tablet, with a diameter typically varying from 0.8 to 4 mm, having a constant cylindrical section over a length typically equal to the diameter and having ends for which the section changes with shrinkage, notably as a spherical cap.

A capsule is illustrated in FIG. **1**D. Said capsule may be defined as an ellipsoid of revolution.

FIG. **1**E illustrates an object having a cylindrical portion of circular section and two symmetrical pointed ends. The distance between the pointed ends is greater than the diameter of the cylindrical portion.

FIG. **1**F illustrates an object having a cylindrical portion of circular section and two symmetrical rounded ends. The radius of curvature may be more or less large but the case when the ends are planar is excluded.

FIG. **1**G shows a borderline case when the variation of the sections of the ends decreases very rapidly, without however being a cylinder with constant section, and for which devices according to the invention are effective.

FIG. **1**H illustrates the case of a tablet which, unlike the objects of FIGS. **1**A to **1**G, does not have rotational symmetry. This object may be defined as having a cylindrical straight portion, the base of which is an ellipse and two faces as ellipsoids. The ends of the object correspond to the ends of the major axis of the ellipse.

Generally, all the shapes obtained within the field of solid galenic field (except for powders, the particles of which are not considered as objects to be counted), may be applied to the objects to be dispensed by the device of the invention.

In pharmaceutical applications, the objects may be granules, micro-granules, capsules, tablets, egg-shaped forms or further gel capsules.

However, any object having one of the alternatives of the forms described above, regardless of its dimensions and proportions, may be dispensed in a determined number by means of a device according to the invention. The invention therefore finds application generally in any field of industry, including the agri-food industry, in which it is necessary to dispense a determined number of objects.

FIGS. **2**A to **2**D illustrate the operating principle of the first obturators **1**B and the second obturator **1**A in a counting and dispensing device (also-called a "dispenser" in the continuation of the text) according to the invention, applied as an example to the dispensing of beads **2**.

In these figures, the tank **3** of beads **2** is located in the upper portion of the dispenser and communicates with a conduit **100** for dispensing the beads which extends along a longitudinal axis X. The direction of flow of the beads from the tank **3** to the outlet of the dispenser is illustrated by the arrow. For the dispensing of beads, the axis X is oriented in a vertical or oblique direction, with the tank above the dispenser, so as to allow the beads to flow by gravity into the conduit **100**.

The conduit **100** has, perpendicularly to the axis X, a section adapted for letting through a single bead, so that the beads are superposed in the conduit **100**.

If the objects to be dispensed are elongated objects, the section of the conduit **100** is adapted for letting through the objects in the direction of their length, i.e. the objects are superposed in the conduit **100** with their convex ends facing each other. The section of the conduit **100** does not allow the passing of an object in an orientation other than that of its length, nor the simultaneous passing of two objects or more through a given section of the conduit.

Advantageously, the junction between the tank of beads and the dispenser assumes the shape of a funnel which gives the possibility of avoiding bracing of the beads at the entry of the conduit **100**. Indeed, spherical or elongated objects with convex ends, considering their symmetries, may tend to be organized so that, taken through the centre of the bottom of a tank, they themselves form a stable, pseudo-tubular structure and therefore hollow in its center, which can only collapse in order that the taking may continue, than under the action of mechanical mixing.

The inner section of the tank **3** is generally greater than that of the conduit **100** and the inner wall of the tank advantageously comprises a portion **1130** tilted towards the downstream side in the direction of shrinkage of the section. The upstream end of the conduit **100** as for it, has a wall **1030** which is tilted in the same direction as the portion **1130**.

The obturators **1**A and **1**B are respectively located in the downstream and upstream portions of the conduit **100** with respect to the direction of flow of the beads.

The obturators **1**A and **1**B delimit between them a portion of the conduit **100** which is a chamber **101** intended to contain a determined number of beads. In the example illustrated in FIGS. **2**A to **2**D, the chamber is intended to receive a single bead, i.e. the distance between the obturators **1**A and **1**B along the axis X is equal to the rated diameter of a bead, but less than 1.5 times the rated diameter of a bead. However, the dispenser according to the invention may be designed so that the chamber **101** comprises two or more beads; for this it is sufficient to adapt the distance between the obturators **1**A and **1**B. The chamber **101** thus fulfills the function of counting the beads to be dispensed while giving the possibility of absorbing the dimensional tolerances inherent to the methods for manufacturing such objects.

FIG. **2**A illustrates a condition of the dispenser in which both obturators **1**A, **1**B are both in an obturation configuration of the chamber **101**, which is then empty.

It will be noted that the portions facing each other of the obturators **1**A, **1**B are not joined contiguously but distant by an interval of less than the diameter of a bead, so as to block the passing of a bead **2** present in the conduit directly upstream from the obturator **1**B. As this will be seen below, the fact that the obturators are not contiguously joined together has the advantage of giving the possibility of retaining the beads without exerting any shear on a bead contained in the chamber **101**. Moreover, the portions facing each other of the obturators advantageously have a bevelled profile.

FIG. **2**B illustrates a condition of the dispenser in which the upstream obturator **1**B is in an open position of the chamber **101** while the downstream obturator **1**A remains in an obturation configuration. Passing from the condition of FIG. **2**A to that of FIG. **2**B is obtained by relative sliding of two elements of the dispenser, embodiments of which will be described in detail below. In the embodiment illustrated here, which corresponds to the device illustrated in FIGS. **5**A to **5**E, the sliding is performed in the axial direction, the element **10** which comprises the passage **100** being moved downstream with respect to an element **11** of the dispenser fixed relatively to the tank **3**. It will be noted that, in the configuration of FIG. **2**B, the portion **1030** with the shape of a funnel of the element **10** is ideally found, but not imperatively, in the extension of the tilted portion **1130** of the tank **3**, which facilitates the entry of the beads into the conduit **100**.

Thus, the predetermined number of beads intended to be received in the chamber **101** (here, a single bead **2**) enters said chamber.

FIG. **2**C illustrates a condition of the dispenser wherein the upstream **1**B and downstream **1**A obturators are in an obturation configuration of the chamber **101**. The transition from the condition of FIG. **2**B to that of FIG. **2**C is obtained by relative sliding of both elements of the dispenser. In the embodiment illustrated here, this sliding is performed in the axial direction, downstream to upstream.

The bead **2** is therefore retained in the chamber **101** between both obturators, no bead being able to enter the chamber **101** or exit from it.

The fact that the obturator **1**B is bevelled gives the possibility that during the closing motion of said obturator, exertion of a shear stress on the bead contained in the chamber **101** or on the bead directly located upstream from said obturator **1**B is avoided. Finally, FIG. **2**D illustrates a condition of the dispenser in which the upstream obturator **1**B remains in the configuration of the chamber **101** while the downstream obturator **1**A is in an open configuration of said chamber. The passing from the condition of FIG. **2**C to that of FIG. **2**D is obtained by relative sliding of both elements of the dispenser. In the embodiment illustrated here, this sliding is performed in the axial direction, downstream to upstream. It will be noted that this sliding has the effect of having the element **10** penetrate into the tank **3**, thereby producing a mixing of the beads which very efficiently avoids possible bracing of the beads at the entry of the tank.

The aperture of the downstream obturator **1**A allows the bead **2** (or the beads if two or more beads were contained in the chamber **101**) to escape from the chamber and thus be extracted from the dispenser.

The next step of the operating sequence comprises the closing of the obturator **1**A, as illustrated in FIG. **2**A. The transition from the condition of FIG. **2**D to that of FIG. **2**A is obtained by relative sliding of both elements of the dispenser. In the embodiment illustrated here, this sliding is performed in the axial direction, from upstream to downstream.

If other beads have to be extracted, the sequence described above is again applied until the desired total number of beads is obtained.

As mentioned above, the conformation of the obturators, i.e. the fact that they are not contiguously joined in an obturation configuration and that they have a bevelled profile, gives the possibility of avoiding the exertion of a shear stress on a bead inserted into the chamber **101** or on a bead upstream from the obturator **1**B which would be partially engaged into the chamber **101** and this, even if the size of the beads varies in a determined range.

FIG. **3**A corresponds to the case when a bead **2** for which the diameter is equal to the rated diameter Øn of the beads is in the chamber **101** (it is considered here that the chamber **101** is designed for receiving a single bead, but this embodiment is not limiting).

The distance between the obturators **1**A and **1**B, which is defined as the distance between the planes perpendicular to the axis X containing the tip of each bevel, is such that the upper end of the bead is flush with the plane containing the end of the bevel of the upstream obturator **1**B. The bead **2** located just upstream from the obturator **1**B is in contact both with the bead **2** contained in the chamber **101** and with the upstream portion of the bevel of the obturator **1**B.

FIG. **3**B corresponds to the case wherein a bead **2**, the diameter of which is equal to the maximum diameter (noted as Øs) of the beads considering the manufacturing tolerances is in the chamber **101**.

The distance between the obturators **1**A and **1**B is identical with that of the dispenser of FIG. **3**A. In this case, the upper end of the bead **2** contained in the chamber **101** juts out towards the upstream side of the plane containing the end of the bevel of the upstream obturator **1**B. The upstream obturator **1**B has a sufficient aperture so as not to exert any stress on the bead **2** contained in the chamber **101**. The bead **2** located just upstream from the obturator **1**B is exclusively in contact with the bead **2** contained in the chamber **101**.

FIG. **3**C corresponds to the case when a bead **2** is in the chamber **101**, the diameter of the bead being equal to the minimum diameter (noted as θi) of the beads considering the manufacturing methods and the tolerances which they generate.

The distance between the obturators **1**A and **1**B is identical with that of the dispenser of FIGS. **3**A and **3**B. In this case, the upper end of the bead **2** contained in the chamber **101** is located set back towards the downstream side with respect to the plane containing the end of the bevel of the upstream obturator **1**B. When the upstream obturator **1**B is in an open configuration in order to let the bead **2** enter the chamber **101**, a second bead **2** located just upstream from said bead is engaged into the chamber **101**; however, when the upstream obturator **1**B has returned to its obturation configuration of the chamber **101**, its bevelled shape gave the possibility of pushing back the upstream bead which was engaged into the chamber **101**, without exerting any shear stress on the latter.

As illustrated in FIG. **3**D, it is therefore possible to size the obturators by taking into account the minimum diameter Øi and the maximum diameter Øs of the beads intended to be dispensed.

As indicated above, the invention is not limited to the dispensing of beads and FIG. **4** illustrates as an example the operation of the dispenser for dispensing gel capsules.

In this figure, a container containing gel capsules **2** is illustrated in a position for dispensing gel capsules, the tank **3** being positioned above the elements **10**, **11** which make up the dispenser. The operating principle of the dispenser is similar to the one illustrated in FIGS. **2**A to **2**D.

The element **10**, which comprises the conduit **100** for dispensing the gel capsules, is laid out so as to slide in the element **11**, which is secured to the container **3**.

The element **10** and the element **11** each have in their upstream portion a respective tilted wall **1030**, **1130**.

In FIG. **4**, said walls are in the extension of each other. This situation corresponds to the case of FIG. **2**C, wherein both obturators **1**A and **1**B are in a position for closing the chamber **101**, which contains a gel capsule **2**.

When the element **10** is slid upstream, i.e. in the direction opposite to the arrow, its tilted wall **1030** extends towards the upstream side beyond the wall **1130** in the tank **3** and has the effect of providing mechanical mixing of the gel capsules on the one hand and of orienting the gel capsule which is contained in the flared upper end of the conduit **100** in the direction of its length on the other hand, thereby allowing said gel capsule to enter the conduit **100**.

A first embodiment of a dispenser according to the invention will now be described with reference to FIGS. **5**A to **5**E. This dispenser is similar to the one illustrated in FIGS. **2**A to **2**D and in FIG. **4**.

FIG. **5**A is an exploded perspective view of both elements **10**, **11** of the dispenser which cooperate for forming the obturators. The arrow indicates the direction of flow of the beads from upstream to downstream.

The element **11** has a generally tubular shape extending along the axis X and the wall of which is pierced with two parallel diametrically opposite grooves **112** which extend from the downstream edge of the element **11**. The grooves **112** are not rectilinear but have two portions **112**A, **112**B tilted in opposite directions on either side of an inflection point **112**C.

The wall of the element **11** is moreover pierced with two rectilinear grooves **113** diametrically opposite, parallel, which extends from the downstream side of the element **11**.

The function of the grooves **112** and **113** will be explained below.

The element **10** is laid out so as to slide in the element **11**, in the axial direction X.

The element **10** comprises a body **103** with a generally tubular shape extending along the axis X and the inner wall of which defines the conduit **100** for dispensing the beads.

From the body **103**, perpendicularly to the axis X, extend two diametrically opposite rectilinear arms **105**. Said arms **105** are located in the downstream portion of the body **103**.

The element **10** moreover comprises two pairs of flexible arms **102**A, **102**B which extend radially substantially orthogonally to the rectilinear arms **105**.

When the dispenser is assembled, the flexible arms **102**A, **102**B of the element **10** are inserted into the grooves **112** of the element **11** while the rectilinear arms **105** of the element **10** are inserted into the rectilinear grooves **113** of the element **11**.

The cooperation of the rectilinear arms **105** and of the rectilinear grooves has the function of guiding the sliding of the element **10** in the element **11**.

During this sliding, the arms **102**A, **102**B follow the path of the tilted grooves **112** and the cooperation of said arms with said grooves forms the obturators **1**A, **1**B and imposes the different configurations of said obturators.

During its use for dispensing beads, the element **11** of the dispenser is generally fixed relatively to the hand of the user, while the element **10** is slid into the element **11**.

FIGS. **5**B and **5**C illustrate two different relative positions of the elements **10** and **11**.

In the situation of FIG. **5**B, the element **10** is located in the downstream portion of the element **11**, the downstream edges of said elements being substantially in the same plane.

The flexible arms **102**A, **102**B are in the downstream portion **112**A of the grooves **112**.

Because of the slope of said portion **112**A of the grooves **112**, the arms **102**A, which are downstream from the arms **102**B are shifted with respect to the latter around the axis X.

Moreover, the slope of the downstream portion **112**A of the grooves **112** tends to bring the arms **102**A closer to each other while moving the arms **102**B away from each other, so that the arms **102**A define a downstream obturator in an obturation configuration while the arms **102**B define an upstream obturator in an open configuration.

FIG. **5**C illustrates a situation in which, relatively to FIG. **5**A, the sliding of the element **10** in the element **11** continued in the upstream direction. In this direction, the upstream arms **102** having passed the inflection point **112**C of the grooves **112** are found in the upstream portion **112**B of said grooves, which has a slope in the direction opposite to that of the downstream portion **112**A.

As the arms **102**A are still in the downstream portion **112**A of the grooves **112**, they tend to move away from each other in order to provide a downstream obturator in an open configuration while the arms **102**B tend to move closer to each other in order to provide an upstream obturator in an obturation configuration.

The grooves **112**, **113** of the element **11** do not extend over the whole height of the latter and therefore provides an abutment of the element **10** towards the upstream side.

The structure of the element **10** will be better understood by observing FIGS. **5**D and **5**E, which represent the element **10** in its initial position at the end of its manufacturing and in its position of use respectively.

The element **10** is advantageously made by injecting a thermoplastic polymeric material, which gives the possibility of making in one piece the arms **102**A, **102**B extending radially from the body **103** and connected to the latter through a hinge **106** which is typically obtained by locally decreasing the thickness of the material.

Said hinge **106** gives the possibility of folding each arm **10**A, **1028** towards the body **103**, as illustrated in FIG. **5**E.

Moreover, each arm **102**A, **1028** comprises a protrusion **104**, which advantageously assumes the shape of a rounded and bevelled portion, laid out facing an aperture **103**A, **1038** of the body when the arms **102**A, **1028** are folded back towards the body.

Depending on the strain exerted on the arms **102**A, **102**B, the protrusions **104** pair wise extend more or less into the inside of the conduit **100**, and thereby form the upstream and downstream obturators which define the chamber intended to receive the bead(s) to be dispensed.

Advantageously, and as discussed above with reference to FIG. **2**D, the sliding of the element **10** into the element **11** in the axial direction provides mixing of the beads contained in the tank and thus avoids bracing phenomena by the geometrical organization of the spherical or elongated objects with convex ends.

In the case of elongated objects, this mixing makes it possible to orient the objects so as to have them enter the conduit **100** in the direction of their length, as explained with reference to FIG. **4**.

It will be noted that this dispenser, which is particularly simple since it exclusively consists of two parts (each of one piece), i.e. the elements **10** and **11**, allows both efficient mixing of the objects and accurate counting of the objects to be dispensed.

With reference to FIGS. **6**A to **6**C, a second embodiment of a dispenser according to the invention will now be described.

The dispenser **1** comprises an element **10** of a generally tubular shape extending along the axis X and the inner wall of which defines the conduit **100** for dispensing the beads. The wall of said element **10** comprises diametrically opposite apertures **107** and each surrounded by two protruding ribs **107**A, **1078** from the outer wall of the element **10**.

The dispenser moreover comprises an element **11** adapted for sliding on the element **10** in a direction perpendicular to the axis X while being guided between the ribs **107**A, **107**B.

For this purpose, the element **11** comprises two parallel arms **110**, **111** which extend perpendicularly to the axis X, said arms **110**, **111** being connected through a wall **114** extending in a plane perpendicular to said arms.

As this is better seen in FIG. **6**B, each arm **110**, **111** has a respective protrusion **110**A, **111**B (which is advantageously bevelled) facing the protrusion of the opposite arm. Moreover, the protrusion **110**A of an arm **110** is not entirely located facing the protrusion **111**B of the arm **111**: a central portion of each of the arms **110**, **111** is provided with a protrusion, said protrusion extending towards an end of the arms **111** and towards the opposite end of the arms **110**.

Each protrusion allows sliding of the element **11** between the ribs **107**A, **107**B of the element **10**. The end of said protrusion extends towards the inside of the conduit **100** when the protrusion is facing the aperture **107**.

The protrusions **111**B facing each other therefore form an upstream obturator and the protrusions **110**A facing each other form a downstream obturator. The operating sequence of said obturators is similar to the one described in reference with FIGS. **2**A-**2**D, the difference lying in that the relative sliding of the elements **10** and **11** is performed here in a

plane perpendicular to the axis X. Unlike the embodiment of FIGS. **5**A to **5**E, the embodiment of FIGS. **6**A to **6**C therefore does not provide any controlled mixing of the objects contained in the tank.

In the example illustrated here, the chamber **101** defined between said obturators is designed for receiving four beads (cf. FIG. **6**C), but it is obvious that it may be designed for receiving a different number of beads or spherical or elongated objects with convex ends, including a single object.

In this respect, it will be noted that the wall of the element **10** is illustrated with a plurality of apertures **107** and of corresponding ribs **107**A, **107**B. Only a pair of apertures upstream from the chamber **101** and a pair of apertures downstream from said chamber is sufficient for producing the dispenser. However, the presence of several apertures and ribs gives the possibility of adjusting the number of beads received in the chamber **101** simply by modifying the spacing of the arms **110**, **111** of the element **11** along the axis X.

Like in the previous embodiment, each of the elements **10** and **11** may be made in one piece. The dispenser is therefore exclusively produced from two parts, the assembling of which is very simple.

According to an embodiment, the dispenser may comprise a relative return device for the elements **10** and **11**, regardless of the contemplated embodiment.

This return device may for example comprise an elastic member laid out between the elements **10** and **11** so as to bring back both upstream and downstream obturators in an open configuration and in an obturation configuration respectively of the chamber.

Advantageously, said elastic return member may be produced in a single piece with one of the first and second elements described above and may thus be made without adding any part in either one of the architectures.

FIGS. **7**A and **7**B thereby illustrate a perspective view of the element **11** and a perspective view of the dispenser **1** assembled according to an alternative of the embodiment of FIGS. **5**A-**5**E. The elements already described with reference to FIGS. **5**A to **5**E are not again described.

The element **11** comprises a curved leaf **115** (for example S-shaped) which extends in the axial direction, said leaf being connected to the wall of the element **11** at its end **115**A, the opposite end **115**B being free.

Advantageously, the leaf **115** is an integral part of the element **11** and may thus be made by molding the element **11**.

The leaf **115** has some elasticity which depends on its shape, on its dimensions and on the material used.

The element **10** comprises at its downstream end, a flange **116** comprising a supporting surface intended to be facing the free end **115**B of the elastic leaf when the element **10** is mounted by sliding in the element **11**. In particular, the flange **116** comprises, on the upstream side, a supporting surface **116**A on which the free end **115**B of the leaf **115** may rest.

The element **11** comprises abutment members **117** forming an abutment towards the downstream side of the flange **116**.

When the dispenser **1** is thus assembled, the leaf **115** tends to push back the element **10** in the axial direction towards the downstream side, in a position in which the upstream obturator is in an open configuration and the downstream obturator is in an obturation configuration, as illustrated in FIG. **7**B (see also FIG. **2**B).

When the intention is to dispense objects, the element **10** is slid in an axial direction towards the upstream side, against the force exerted by the leaf **115**.

In a first phase, this sliding places both obturators in an obturation configuration of the chamber (cf. FIG. **2**C).

In a second phase, as the sliding continues towards the upstream side, the upstream obturator remains in an obturation configuration while the downstream obturator passes into an open configuration of the chamber (cf. FIG. **2**D). By doing this, the object(s) which was (were) contained in the chamber is (are) released from the dispenser.

The element **10** is then released, which is pushed back by the leaf **115** in the axial direction towards the downstream side and which thus brings it back into the configuration illustrated in FIG. **7**B. As the upstream obturator is in an open configuration of the chamber, new objects may be introduced into the chamber while being retained by the downstream obturator which is in the closing configuration.

FIGS. **8**A and **8**B respectively illustrate a perspective view of the element **11** and a perspective view of the dispenser **1** assembled according to an alternative of the embodiment of FIGS. **6**A-**6**C. The elements already described with reference to FIGS. **6**A to **6**C are not described again.

The wall **114** has a longitudinal notch **114**A in which extends a curved leaf **115** protruding in the direction of the arms **110**, **111**, the leaf **115** being secured to the wall **114** at one of its ends **115**A.

Advantageously, the leaf **115** is an integral part of the element **11** and may thus be made by molding the element **11**.

The leaf **115** has some elasticity which depends on its shape, on its dimensions and on the material used.

When the element **10** is slidably mounted on the element **11**, the leaf **115** tends to push back the element **10** in the direction opposite to that of the wall **114**, in a position in which the upstream obturator is in an open configuration and the downstream obturator is in an obturation configuration, as illustrated in FIG. **8**B.

When the intention is to dispense objects, the element **10** is slid towards the wall **114**, against the force exerted by the leaf **115**.

In a first phase, this sliding places both obturators in an obturation configuration of the chamber by cooperation of the element **11** simultaneously with the protrusions **110**A and **111**B of both arms.

In a second phase, as the sliding continues towards the wall **114**, the upstream obturator remains in an obturation configuration by cooperation of the element **10** with the protrusion **111**B, while the downstream obturator passes into an open configuration of the chamber, the element **10** disengaging from the protrusion **110**A. By doing this, the object(s) which was (were) contained in the chamber is (are) released from the dispenser.

The element **10** is then released, which is pushed back by the leaf **115** in the direction opposite to the wall **114** and which thus brings it back into the configuration illustrated in FIG. **8**B. As the upstream obturator is in an open configuration of the chamber, new objects may be introduced into the chamber while being retained by the downstream obturator which is in a closing configuration.

The dispenser, various embodiments of which have been described above, may appear as a component to be assembled on a tank containing objects to be dispensed. The dispenser then has dimensions allowing it to be adapted on an existing tank, such as a tube, notably a tube for homeopathic granules. Securing the dispenser on the container is

achieved by any suitable means, including a weld, an adhesive bonding, snap-on fastening, etc.

Alternatively, the dispenser may comprise the tank, for example by ensuring that one of the elements is manufactured in one piece with the tank. In the case when the dispenser has an axial sliding architecture (embodiment of FIGS. **5**A to **5**E), it is the element **11** which is integrated to the tank, the element **10** comprising the dispensing conduit **100** being movable by axial sliding and thereby allowing mixing of the objects contained in the tank. In the case when the dispenser has a sliding architecture in a plane perpendicular to the longitudinal axis, the element **10** comprising the dispensing conduit **100** is advantageously integrated to the tank, the element **11** being movable.

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The invention claimed is:

1. A device for counting and dispensing objects, comprising

a first element comprising a conduit for dispensing objects to be counted and dispensed, the conduit comprising an axis defining a direction of flow of the objects within the conduit,

a second element cooperating with the first element such that the first and second elements together operate first and second obturators arranged in upstream and downstream portions of the conduit, the first obturator spaced from the second obturator such that the first and second obturators operate independently, the obturators delimiting in the conduit a chamber adapted for containing a pre-determined number of said objects,

wherein the first and second elements are slidably movable relative to each other along the axis of the conduit,

each of the first and second obturators being able to implement, depending on the relative position of said first and second elements:

an open configuration of the chamber, in which opposite ends of each of the first and second obturators define an orifice with a dimension adapted for letting through an object to be counted and dispensed, and

an obturation configuration of the chamber, in which opposite ends of each of the first and second obturators are closer than a respective open configuration so that said orifice has a dimension insufficient for letting through an object, one of the opposite ends of said first and second obturators having a beveled portion facing a beveled portion of the other one of the opposite ends of the first and second obturators and not contiguously joined in said obturation configuration,

the first and second elements being slidably arranged relative to each other so as to provide, by relative sliding along the axis of the conduit, a sequence for operating the obturators wherein:

(i) a first obturator is in said open configuration while the second obturator is in said obturation configuration of the chamber,

(ii) the first and the second obturators are both in said obturation configuration of the chamber,

(iii) the first obturator is in said obturation configuration while the second obturator is in said open configuration of the chamber,

(iv) the first and the second obturators are both in said obturation configuration of the chamber; and

wherein the first element is slidably arranged relative to the second element along an axial direction of the conduit so that, during a portion of the operating sequence, the first element moves towards an upstream side into a storage area relatively to the direction of flow of the objects, so as to provide mixing of the objects to be counted and dispensed located upstream from the conduit.

2. The device according to claim **1**, wherein the conduit has, at its upstream end, a tilted wall so as to orient and/or guide in the conduit the objects to be counted and dispensed.

3. The device according to claim **1**, further comprising a relative return device for the first and second elements.

4. The device according to claim **3**, wherein said return device comprises an elastic return member secured to the first or to the second element.

5. The device according to claim **1**, wherein the first and the second element are each separately made in one piece, the device consisting of said first and second elements.

6. The device according to claim **1**, further comprising a container containing objects.

7. The device according to claim **6**, wherein the objects are one of homeopathic granules, gel capsules, tablets, capsules or microgranules.

8. The device for counting and dispensing objects of claim **1**, wherein the first element includes a sloped wall configured to provide mixing of the objects located upstream from the conduit by contacting the object with the sloped wall of the first element.

9. The device for counting and dispensing objects of claim **1**, wherein the first and second obturators move independently from each other.

10. The device for counting and dispensing objects of claim **1**, wherein the storage area is a tank.

11. A device for counting and dispensing objects, comprising two slidably movable elements relatively to each other,

a first element comprising a conduit for dispensing objects to be counted and dispensed,

a second element cooperating with the first element for operating first and second obturators delimiting in the dispensing conduit a chamber adapted for containing a pre-determined number of said objects, the first obturator spaced from the second obturator such that the first and second obturators operate independently,

each of the first and second obturators being configured to adopt, depending on a relative position of said first and second elements:

an open configuration of the chamber, in which each of the first and second obturators defines an orifice with a dimension adapted for letting through an object to be counted and dispensed, and

an obturation configuration of the chamber, in which said orifice has a dimension insufficient for letting through an object, each of the first and second obturators having two beveled portions facing each other and not contiguously joined in said obturation configuration,

the first and second elements being slidably arranged relative to each other so as to provide, by relative sliding, an operating sequence for operating the obturators wherein:

(i) the first obturator is in an open configuration while the second obturator is in an obturation configuration of the chamber,

(ii) the first and the second obturators are both in an obturation configuration of the chamber,

(iii) the first obturator is in an obturation configuration while the second obturator is in an open configuration of the chamber,

(iv) the first and the second obturators are both in an obturation configuration of the chamber,

wherein the first element is slidably laid out with respect to the second element along an axial direction of the conduit so that, during a portion of the operating sequence, the first element moves towards the upstream side into a storage area relatively to the direction of flow of the objects, so as to provide mixing of the objects to be counted and dispensed located upstream from the conduit.

12. The device for counting and dispensing objects of claim **11**, wherein the first and second obturators move independently from each other.

13. The device for counting and dispensing objects of claim **11**, wherein the storage area is a tank.

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